US-PAT-NO: 6078568

DOCUMENT-IDENTIFIER: US 6078568 A
See image for Certificate of Correction

TITLE: Multiple access communication network with dynamic access control

---------- KWIC ---------

The benefits of the present invention may further be understood in the context of Aloha system performance. The dynamics of the stability issue may be revealed if the throughput versus attempt rate response (S vs. G curve) of an existing slotted Aloha system is considered, as illustrated in FIG. 24. Misinterpretation of the system's performance occurs because it would appear that provided the attempt rate (G) is kept below unity, the channel utilization (S) would appear acceptable and stable. Unfortunately this static interpretation is flawed because it does not reflect the time based dynamic behavior of the system. The Aloha system is stable if and only if the departure rate is equal to the arrival rate. Consider the scenario when the attempt rate is unity. For every 10 transmission attempts, approximately 3 are successful. The 7 unsuccessful packets will become queued for re-transmission. During a subsequent time interval in which another 10 transmission attempts are executed, only 3 transmission attempts may correspond to new packets that have

arrived if stability is to be achieved. If less than 3 new packets arrive, the operating point on the Aloha response curve will drift to the left and the channel utilization will fall. This is a satisfactory occurrence because although the channel is not being utilized at its maximum, the delay experienced with the delivery of each packet is negligible and the system appears to provide excellent service to all users. However, if the number of new arrivals exceeds 3, the number of transmission attempts in a subsequent interval of time will exceed 10 and, as a consequence, an increase in the number of collisions will be observed. This will cause the number of successful transmissions to fall, which results in a decrease in channel utilization and a further increase in the number of attempted re-transmissions during a subsequent time slot. Consequently, the operating point to drifts to the right of the optimum operating point. If the new arrival rate continues to exceed the successful departure rate then the operating point will continue to .

drift to the right. This is a highly undesireable scenario because the channel utilization falls and, as a consequence, so does the level of revenue-bearing traffic. The delay associated with the delivery of each packet dramatically increases and the quality of the system that is perceived by the users falls. This scenario is often referred to as an Aloha or Reverse channel collapse.

US-PAT-NO: 6055564

DOCUMENT-IDENTIFIER: US 6055564 A

TITLE: Admission control where priority indicator is used to discriminate between messages

---------- KWIC ---------

If the message is not part of a transaction in-progress, the admission control gateway 125 can also admit the message as a new session if it is determined that the server has sufficient processing resources available, as determined by comparison with the set of parameters 129 (the determination is indicated in FIG. 3 by the reference numeral 147). The admission control gateway 125 can further admit the message if it is determined that the message corresponds to a message which has been previously deferred, as indicated by a decision block 149. In this regard, these two determinations can be performed in alternative order depending upon the particular implementation. For example, in an embodiment where reserved time slots are used and dynamic parameters 129 are used to regulate un-reserved (or contention) time slots, it is preferable to detect new sessions having reserved time slots so as to not reduce the number of contention slots available. In the preferred embodiment, specific slots are not used and the parameters 129 include a single, static threshold, with lowest priority (e.g., most recently received, non-priority) messages being deferred, even if already in-progress, if the server only has processing resources for priority messages. Consequently, the determinations can equivalently be performed in the preferred embodiment in the order indicated in FIG. 3. Notably, processing using priority classes is identified as a processing block by the reference numeral 500, and will be discussed further below. If the determinations do not result in admission of the message to the server, then the message is sent to the deferral manager, as indicated by the bottom most block 141 of FIG. 3.

US-PAT-NO: 4718062

DOCUMENT-IDENTIFIER: US 4718062 A

TITLE: Telecommunication system for alternatingly transmitting circuit-switched and packet-switched information

---------- KWIC ---------

A system is described for multiplexing telephony channels with static and dynamic capacity. A static channel occupies a time slot in a fixed frame structure. The dynamic channels utilize idle time slots. A status bit per time slot states whether the time slot is occupied or not. According to the invention, equipment for transmitting circuit-switched information is combined with equipment for transmitting packet-switched information, such that a hybrid system is obtained which, under the control of a status bit, alternatingly transfers information from the respective equipment in response to the polarity of the status bit.

The system in accordance with the invention, which solves the above-mentioned problem, is characterized by the claims and includes an apparatus for multiplexing telephony channels with static and dynamic capacity.
A static channel occupies a time slot in a fixed frame structure. The dynamic channels utilize unoccupied time slots. A status bit per time slot denotes whether the slot is occupied or not. The above-mentioned problems are solved by a memory unit CS (Circuit Switch) in a transmitter for circuit switching being continuously scanned in an apparatus for alternatingly transmitting circuit-switched and packet-switched information, and that the memory contains information corresponding to a number of time slots, in their turn corresponding to a number of information channels in a TDM-system. Each time slot is assigned with the aid of a time slot number, and in every memory position corresponding to a time slot there is written a data word. A status bit is inserted in the data word, which comprises a plurality of bits, this status bit having a polarity which on scanning denotes whether an assigned channel is occupied or not. If the channel is occupied, i.e. the status bit has a given polarity, e.g. a logical One, the information is sent out on the line to a receiver from said circuit-switching transmitter. On the other hand, if the time slot is idle, which is apparent from the status bit having the

reversed polarity, in this case a logical Zero, the information is instead sent out over the line to the receiver from a buffer memory PS (Packet Switch) in a transmitter for packet-switching. The circuit-switching memory CS has priority over the packet switching memory PS, the latter memory only being allowed to send when an idle <u>time slot</u> is detected on scanning the memory CS. The right to send falls directly therafter to the circuit-switching memory CS. The memory PS sends a segment which is equally as great as the <u>time slot</u> excluding the status bit.

US-PAT-NO: 5930334

DOCUMENT-IDENTIFIER: US 5930334 A

TITLE: Method and apparatus for monitoring the operation of telecommunications equipment

---------- KWIC ---------

In this example application, the subscriber line includes not only the wireline 18 and corresponding line interface circuit 20 but also the multiplexer/demultiplexer (MUX/DEMUX) 42 and an assigned TDM timeslot(s) on TDM
line 44. Thus, depending upon whether individual time slots are assigned to subscriber lines in a static or dynamic fashion, the actual subscriber path corresponding to a subscriber line may vary.

US-PAT-NO: 5875184

DOCUMENT-IDENTIFIER: US 5875184 A

TITLE: Method for transferring data packets

---------- KWIC ---------

The reason is that if the time slots are allocated to the user stations as needed, in other words for example on a load-dependent basis, it is on the one hand possible to react flexibly to fluctuating network load conditions. A user station that currently has a high transfer requirement thus receives more time slots assigned to it than other user stations which have no data or very little data to transfer per unit time. This is possible, surprisingly, because channels are not only (as in the related art) allocated to the user stations from the frequency-hopping pattern, but rather time slots are allocated to the user stations, the particular channels to be used for transfer being defined by the frequency-hopping pattern. The frequency-hopping pattern itself can be, for example, static, or can be managed dynamically by the primary users based on channel occupancy. This can occur, however, independently of the dynamic allocation of time slots to the user stations.

US-PAT-NO: 5732076

DOCUMENT-IDENTIFIER: US 5732076 A

TITLE: Coexisting communication systems

--------- KWIC ---------

In more detail, each base station unit 852, 853 is provided with means for determining which time slots of the composite time frame are available, or have been preassigned to it, for communication. The first base station unit 852 has a free slot index 863 which may comprise, for example, a static or dynamic memory. If the free slot index 863 comprises a dynamic memory, then it may be downloaded remotely by a base station controller 105 (see FIG. 2) so as to allow dynamic reprogramming of the time slot allocation to the base station units 852, 853. The free slot index 863 stores a map of time slots allocated to the base station unit 852. Thus, if composite time frame 925 of FIG. 15 is implemented in the FIG. 13 integrated base station 850, then the free slot index 863 would comprise a map having sixteen locations, each location corresponding to one of the time slots 922, with the locations corresponding to time slots TS00, TS04, TS08, and TS12 being set to indicate their assignment to the first base station unit 852.